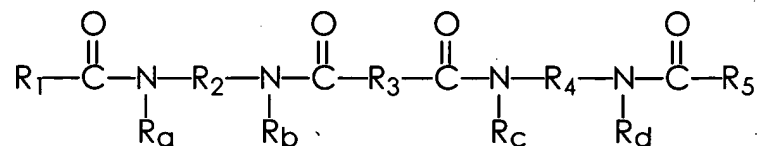


1. A process for preparing a phase change ink composition which comprises (a) a phase change ink carrier, said carrier comprising at least one nonpolar component and at least one polar component, and (b) pigment particles, said process comprising (1) selecting at least one of the polar carrier components to be a pigment particle dispersant; (2) admixing the pigment particles with the dispersant; (3) extruding the mixture of pigment particles and dispersant in an extruder at a temperature that is at or above about the peak crystallization temperature of the dispersant and below about the peak melting temperature of the dispersant, thereby forming a pigment dispersion; (4) subsequent to extrusion of the pigment dispersion, adding to the pigment dispersion any remaining polar components and the nonpolar component; and (5) subjecting the resulting mixture of pigment dispersion, polar component, and nonpolar component to high shear mixing to form an ink.

2. A process according to claim 1 wherein the dispersant is a tetra-amide, a monoamide, a urethane, or a mixture thereof.

3. A process according to claim 1 wherein the dispersant is a tetra-amide.

4. A process according to claim 1 wherein the dispersant is a tetra-amide of the formula



wherein (1) R_a , R_b , R_c , and R_d each, independently of the others, is (a) a hydrogen atom, (b) an alkyl group, (c) an aryl group, (d) an arylalkyl group, or (e) an alkylaryl group, (2) R_2 , R_3 , and R_4 each, independently of the others, are (a) an alkylene group, (b) an arylene group, (c) an arylalkylene group, or (d) an alkylarylene group, and (3) R_1 and R_5 each, independently of the other, is (a) an alkyl group, (b) an aryl group, (c) an arylalkyl group, or (d) an alkylaryl group.

5. A process according to claim 4 wherein at least one of the alkyl, alkylene, aryl, arylene, arylalkyl, arylalkylene, alkylaryl, and alkylarylene groups is substituted.

6. An ink according to claim 4 wherein none of the alkyl, alkylene, aryl, arylene, arylalkyl, arylalkylene, alkylaryl, and alkylarylene groups are substituted.

7. An ink according to claim 4 wherein at least one of the alkyl, alkylene, aryl, arylene, arylalkyl, arylalkylene, alkylaryl, and alkylarylene groups has at least one hetero atom therein.

8. An ink according to claim 7 wherein the one or more hetero atom is oxygen, nitrogen, sulfur, silicon, phosphorus, or a mixture thereof.

9. An ink according to claim 4 wherein none of the alkyl, alkylene, aryl, arylene, arylalkyl, arylalkylene, alkylaryl, and alkylarylene groups have hetero atoms therein.

10. An ink according to claim 4 wherein R_1 and R_5 are both $-(CH_2)_{16}CH_3$, R_2 and R_4 are each $-CH_2CH_2-$, and R_3 is a branched unsubstituted alkyl group having about 34 carbon atoms.

11. An ink according to claim 4 wherein R_1 and R_5 are both $-(CH_2)_nCH_3$ wherein n is 47 or 48, R_2 and R_4 are each $-CH_2CH_2-$, and R_3 is a branched unsubstituted alkyl group having about 34 carbon atoms.

12. A process according to claim 1 wherein the dispersant is a dimer acid based tetra-amide that is the reaction product of dimer acid, ethylene diamine, and a long chain hydrocarbon having greater than thirty six carbon atoms and having a terminal carboxylic acid group.

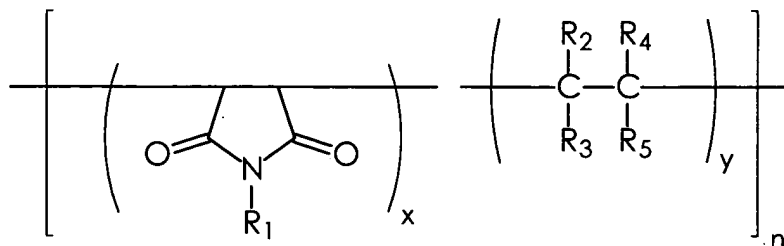
13. A process according to claim 1 wherein the nonpolar component is a polyethylene wax.

14. A process according to claim 1 wherein the nonpolar component comprises a polyethylene wax, the polar component comprises a tetra-amide, a monoamide, and a urethane, and the dispersant is a tetra-amide.

15. A process according to claim 1 wherein the phase change ink carrier comprises (1) stearyl stearamide, present in the carrier in an amount of at least about 8 percent by weight, and present in the carrier in an amount of no more than about 32 percent by weight, (2) a dimer acid based tetra-amide that is the reaction product of dimer acid, ethylene diamine, and a long chain hydrocarbon having greater than thirty six carbon atoms and having a terminal carboxylic acid group, present in the carrier in an amount of at least about 10 percent by weight, and present in the carrier in an amount of no more than about 32 percent by weight, (3) a polyethylene wax, present in the carrier in an amount of at least about 25 percent by weight, and present in the carrier in an amount of no more than about 60 percent by weight, (4) a urethane resin derived from the reaction of two equivalents of hydroabietyl alcohol and one equivalent of isophorone diisocyanate, present in the carrier in an amount of at least about 6 percent by weight, and present in the carrier in an amount of no more than about 16 percent by weight, (5) a urethane resin that is the adduct of three equivalents of stearyl isocyanate and a glycerol-based alcohol, present in the carrier in an amount of at least about 2 percent by weight, and present in the carrier in an amount of no more than about 13 percent by weight, and (6) an antioxidant, present in the carrier in an amount of at least about 0.01 percent by weight, and present in the carrier in an amount of no more than about 1 percent by weight.

16. A process according to claim 1 wherein the ink further contains a polyalkylene succinimide.

17. A process according to claim 16 wherein the polyalkylene succinimide is of the formula



wherein x is an integer representing the number of repeat succinimide units, y is an integer representing the number of repeat alkylene units, n is an integer, R₁ is an alkyl group, an aryl group, an arylalkyl group, or an alkylaryl group, and R₂, R₃, R₄, and R₅ each, independently of the others, is a hydrogen atom or an alkyl group.

18. A process according to claim 17 wherein x is from 1 to about 3, y is from 1 to about 3, n is at least about 2, and n is no more than about 500.

19. A process according to claim 17 wherein at least one of the alkyl, aryl, arylalkyl, and alkylaryl groups is substituted.

20. A process according to claim 17 wherein none of the alkyl, aryl, arylalkyl, and alkylaryl groups are substituted.

21. A process according to claim 17 wherein at least one of the alkyl, aryl, arylalkyl, and alkylaryl groups has at least one hetero atom therein.

22. A process according to claim 21 wherein the one or more hetero atom is oxygen, nitrogen, sulfur, silicon, phosphorus, or a mixture thereof.

23. A process according to claim 17 wherein none of the alkyl, aryl, arylalkyl, and alkylaryl groups have hetero atoms therein.

24. A process according to claim 17 wherein R_2 , R_3 , and R_4 are hydrogen atoms and R_5 is an alkyl group.

25. A process according to claim 17 wherein R_2 and R_3 are hydrogen atoms and R_4 and R_5 are methyl groups.

26. A process according to claim 16 wherein the polyalkylene succinimide is polyisobutylene succinimide.

27. A process according to claim 16 wherein the polyalkylene succinimide is present in the ink in an amount of at least about 1×10^{-7} percent by weight of the ink.

28. A process according to claim 16 wherein the polyalkylene succinimide is present in the ink in an amount of at least about 1×10^{-5} percent by weight of the ink.

29. A process according to claim 16 wherein the polyalkylene succinimide is present in the ink in an amount of at least about 0.001 percent by weight of the ink.

30. A process according to claim 16 wherein the polyalkylene succinimide is present in the ink in an amount of at least about 0.005 percent by weight of the ink.

31. A process according to claim 16 wherein the polyalkylene succinimide is present in the ink in an amount of at least about 0.01 percent by weight of the ink.

32. A process according to claim 16 wherein the polyalkylene succinimide is present in the ink in an amount of no more than about 40 percent by weight of the ink.

33. A process according to claim 16 wherein the polyalkylene succinimide is present in the ink in an amount of no more than about 30 percent by weight of the ink.

34. A process according to claim 16 wherein the polyalkylene succinimide is present in the ink in an amount of no more than about 20 percent by weight of the ink.

35. A process according to claim 16 wherein the polyalkylene succinimide is present in the ink in an amount of no more than about 10 percent by weight of the ink.

36. A process according to claim 1 wherein the pigment particles have acidic functional groups on the surfaces thereof.

37. A process according to claim 1 wherein the pigment particles have basic functional groups on the surfaces thereof.

38. A process according to claim 1 wherein the pigment is present in the ink in an amount of at least about 0.1 percent by weight of the ink.

39. A process according to claim 1 wherein the pigment is present in the ink in an amount of at least about 0.2 percent by weight of the ink.

40. A process according to claim 1 wherein the pigment is present in the ink in an amount of at least about 0.5 percent by weight of the ink.

41. A process according to claim 1 wherein the pigment is present in the ink in an amount of no more than about 50 percent by weight of the ink.

42. A process according to claim 1 wherein the pigment is present in the ink in an amount of no more than about 20 percent by weight of the ink.

43. A process according to claim 1 wherein the pigment is present in the ink in an amount of no more than about 10 percent by weight of the ink.

44. A process according to claim 1 wherein the ink further contains a dye.

45. A process according to claim 44 wherein the dye is a phthalocyanine.

46. A process according to claim 1 wherein the pigment particles and the dispersant in powder form are admixed prior to mixing in the extruder.

47. A process according to claim 1 wherein the relative amounts of pigment particles and dispersant in the extruder are at least about 0.1 parts by weight dispersant per every 1 part by weight pigment.

48. A process according to claim 1 wherein the relative amounts of pigment particles and dispersant in the extruder are no more than about 20 parts by weight dispersant per every 1 part by weight pigment.

49. A process according to claim 1 wherein the viscosity of the mixture of pigment particles and dispersant in the extruder is at least about 10 centipoise.

50. A process according to claim 1 wherein the viscosity of the mixture of pigment particles and dispersant in the extruder is no more than about 10,000 centipoise.

51. A process according to claim 1 wherein the viscosity of the mixture of pigment particles and dispersant in the extruder is no more than about 1,000 centipoise.

52. A process according to claim 1 wherein the extruder is operated at a screw rotation rate of at least about 40 rpm.

53. A process according to claim 1 wherein the extruder is operated at a screw rotation rate of no more than about 100 rpm.

54. A process according to claim 1 wherein the extruder is maintained within a temperature range of from about the peak crystallization temperature to about 30 percent above the peak crystallization temperature.

55. A process according to claim 1 wherein the extruder is maintained within a temperature range of from about the peak crystallization temperature to about 20 percent above the peak crystallization temperature.

56. A process according to claim 1 wherein the extruder is maintained within a temperature range of from about the peak crystallization temperature to about 10 percent above the peak crystallization temperature.

57. A process according to claim 1 wherein the extruder is maintained within a temperature range of about 10 percent or more below the peak melting temperature.

58. A process according to claim 1 wherein the extruder is maintained within a temperature range of about 15 percent or more below the peak melting temperature.

59. A process according to claim 1 wherein the extruder is maintained within a temperature range of about 20 percent or more below the peak melting temperature.

60. A process according to claim 1 wherein, subsequent to extrusion of the pigment dispersion and prior to adding to the pigment dispersion any remaining polar components and the nonpolar component, the pigment dispersion is subjected to high shear mixing.

61. A process according to claim 60 wherein the viscosity of the pigment dispersion during high shear mixing is at least about 200 centipoise.

62. A process according to claim 60 wherein the viscosity of the pigment dispersion during high shear mixing is no more than about 10,000 centipoise.

63. A process according to claim 60 wherein the viscosity of the pigment dispersion during high shear mixing is no more than about 1,000 centipoise.

64. A process according to claim 60 wherein the pigment dispersion is subjected to high shear mixing with a rotor/stator mixer operating with a tip speed of at least about 7 meters per second.

65. A process according to claim 60 wherein the pigment dispersion is subjected to high shear mixing with a rotor/stator mixer operating with a tip speed of at least about 12 meters per second.

66. A process according to claim 60 wherein the pigment dispersion is subjected to high shear mixing with a rotor/stator mixer operating at at least about 1,000 rpm.

67. A process according to claim 60 wherein the pigment dispersion is subjected to high shear mixing with a rotor/stator mixer operating at at least about 5,000 rpm.

68. A process according to claim 60 wherein the pigment dispersion is subjected to high shear mixing with a rotor/stator mixer operating at at least about 7,500 rpm.

69. A process according to claim 60 wherein the pigment dispersion is subjected to high shear mixing at a shear rate of at least about $5,000 \text{ s}^{-1}$.

70. A process according to claim 60 wherein the pigment dispersion is subjected to high shear mixing at a shear stress of at least about 50 kilograms per meter.

71. A process according to claim 1 wherein the mixture of pigment dispersion, polar component, and nonpolar component is subjected to high shear mixing with a rotor/stator mixer operating with a tip speed of at least about 7 meters per second.

72. A process according to claim 1 wherein the mixture of pigment dispersion, polar component, and nonpolar component is subjected to high shear mixing with a rotor/stator mixer operating with a tip speed of at least about 12 meters per second.

73. A process according to claim 1 wherein the mixture of pigment dispersion, polar component, and nonpolar component is subjected to high shear mixing with a rotor/stator mixer operating at at least about 1,000 rpm.

74. A process according to claim 1 wherein the mixture of pigment dispersion, polar component, and nonpolar component is subjected to high shear mixing with a rotor/stator mixer operating at at least about 5,000 rpm.

75. A process according to claim 1 wherein the mixture of pigment dispersion, polar component, and nonpolar component is subjected to high shear mixing with a rotor/stator mixer operating at at least about 7,500 rpm.

76. A process according to claim 1 wherein the mixture of pigment dispersion, polar component, and nonpolar component is subjected to high shear mixing at a shear rate of at least about $5,000\text{ s}^{-1}$.

77. A process according to claim 1 wherein the mixture of pigment dispersion, polar component, and nonpolar component is subjected to high shear mixing at a shear stress of at least about 50 kilograms per meter.

78. A process for preparing a phase change ink composition which comprises (a) a phase change ink carrier, said carrier comprising at least one nonpolar component and at least one polar component, said polar component comprising a tetra-amide, and (b) pigment particles, said process comprising (1) admixing the pigment particles with the tetra-amide; (2) extruding the mixture of pigment particles and tetra-amide in an extruder at a temperature that is at or above about the peak crystallization temperature of the tetra-amide and below about the peak melting temperature of the tetra-amide, thereby forming a pigment dispersion; (3) subsequent to extrusion of the pigment dispersion, adding to the pigment dispersion any remaining polar components and the nonpolar component; and (4) subjecting the resulting mixture of pigment dispersion, polar component, and nonpolar component to high shear mixing to form an ink.

79. A process according to claim 78 wherein the ink further contains a polyalkylene succinimide.

80. A process for preparing a phase change ink composition which comprises (a) a phase change ink carrier, said carrier comprising at least one nonpolar component and at least one polar component, said polar component comprising a tetra-amide, and (b) pigment particles, said pigment particles having either acidic groups or basic groups on the surfaces thereof, said process comprising (1) admixing the pigment particles with the tetra-amide; (2) extruding the mixture of pigment particles and tetra-amide in an extruder at a temperature that is at or above about the peak crystallization temperature of the tetra-amide and below about the peak melting temperature of the tetra-amide, thereby forming a pigment dispersion; (3) subsequent to extrusion of the pigment dispersion, subjecting the pigment dispersion to high shear mixing; and (4) subsequent to high shear mixing of the pigment dispersion, adding to the pigment dispersion any remaining polar components and the nonpolar component while continuing high shear mixing, thereby forming an ink.